ABSTRACT

Title of Thesis: WHO WILL VERIFY THEIR CLAIMS?: INVESTIGATING THE INFLUENCE OF GROUP MEMBERSHIP ON CHILDREN'S EXPECTATIONS ABOUT OTHERS' EMPIRICAL PRACTICES

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The technological landscape of today allows for almost instantaneous global circulation and retrieval of testimonial claims. Children and adults alike are increasingly faced with the task of evaluating claims' reliability without an ability to assess the validity of the process by which that knowledge is acquired. *Expectations* of a standard of empirical practice may vary based on the identity of the informant and can thus guide to whom we ascribe epistemic trust. The current studies examine whether 4- to 7-year-old children extend expectations of others' standard of empirical practice differentially to minimal group members. In both the Pilot (N=36) and Main Experiment (N=96), children were randomly assigned to one of two color groups. We tested whether children's attributions of verification behaviors were informed by their preference for and perceived similarity to ingroup members. We found that children were just as likely to ascribe verified and unverified claims to ingroup members as they were to outgroup members. A number of possible explanations for this finding is discussed, laying groundwork for an important line of research studying the relation between children's expectations of others' standard of empirical practice and perceptions of trustworthiness.

WHO WILL VERIFY THEIR CLAIMS?: INVESTIGATING THE INFLUENCE OF GROUP MEMBERSHIP ON CHILDREN'S EXPECTATIONS ABOUT OTHERS' EMPIRICAL PRACTICES

by

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Chapter 1: Introduction

A great deal of what we know is based in what others tell us. Indeed, the technological landscape of today allows for *testimony* – information communicated by persons (e.g., McMyler, 2007)– to promulgate across the world at a staggering rate. To address the ever-increasing challenge of navigating the trustworthiness and validity of a nearly infinite number of sources, a pressing issue of the 21st century is to promote scientific literacy – an understanding of the scientific ways of knowing (Maienschein, 1999). Scientific literacy places an emphasis on thinking critically about our surrounding world, with an ultimate goal to produce skeptical and creative habits of mind (e.g., Nelson, 1999; Maienschein, 1999). Thus, although learning scientific facts and concepts from others is an efficient learning tool (e.g., Dawkins, 1993), allowing one to acquire information that may otherwise be difficult to attain on their own, it also poses a challenge in that the receiver must *trust* that this information is accurate. This epistemological challenge is of particular importance for young children as they are especially reliant on information provided by others at a time during which they are still developing the cognitive skills required to critically evaluate encountered claims (Harris & Koenig, 2006).

The scientific process does not unfold in a vacuum, and so by extension, scientific habits of mind must also be emphasized as critical for effectively learning from others – an inherently social process. The concepts of trust and trustworthiness have long been studied by philosophers and psychologists; one such perspective is that trustworthiness can be seen as a virtue, or a trait (Hardin 2002; Jones, 1999;

Potter 2002). According to this view, trusting a claim to be true suggests the listener's favorable disposition toward the speaker (Giffin, 1967). There are a number of possibilities for explaining a listener's favorable disposition, however, and so the explanation is most often dependent on both the context in which a claim was made, and the domain of knowledge required for it to be credible.

Highlighting the importance of the *process* by which an informant has acquired the knowledge they communicate to others, promotes early development of scientific habits of mind and in turn, supports young children's ability to critically evaluate an empirical claim. However, the process is fundamentally connected to the individual performing it, leading us to the current study which investigates whether young children perceive some extent of social value in individuals' *choice* to verify the information they plan to communicate to others. In the following sections, I provide a review of findings from current research which lends to the empirical questions at hand.

First, I begin with a broad overview of a paradigm most recently utilized to determine how children distinguish reliable information sources from those that are not or less so. Following, I review how this process differs in terms of the content of the claim itself (i.e., the knowledge domain required), and based on the identity of the informant. Further, I analyze present research examining pre-school children's evaluations of the empirical process and its relation to an informant's perceived trustworthiness as a source. Subsequently, I discuss the current gap in the developmental literature, which this study aims to address. Lastly, I provide a general rationale and overview of the theoretical framework guiding the current research.

Chapter 2: Review of the Literature

2.1 Selective Trust in Testimony

Recent research in developmental psychology has devoted a great deal of attention to children's demonstration of *selective trust* – a term used to describe the ability to discern whom should be trusted from those who should not (e.g., Clement, 2010; Harris & Corriveau, 2011; see Mills, 2013 for a detailed review). Although we tend to perceive young children as naïve and credulous, their selectivity suggests an early understanding that epistemic sources vary in their reliability; or said simply, that not all information is accurate. The typical paradigm used in this line of research involves introducing children to one or two informants, who will serve as the epistemic sources providing the claims that children are prompted to evaluate. This initial introduction is designed to provide background information, such as informants' particular characteristics or behaviors that may be relevant when assessing the reliability of their testimony in later, novel tasks. In other words, such introductions are presented to assess whether children deem the observed characteristics or behaviors as an indication of whether or not an informant is likely to serve as a reliable source of information in future.

Common variations of this initial phase in the paradigm include providing children with a description of the informants (e.g., "This person is a trickster") or showing informants as consistently behaving in a particular way (e.g., establishing a history of accuracy or inaccuracy). Koenig, Clément, and Harris (2004), for example, conducted a study in which three- and four-year old children observed two informants

label familiar objects (e.g., cup, ball, car), one informant as the consistently accurate labeler and the other the consistently inaccurate labeler. This particular study sought to examine whether an informant's prior accuracy in labeling *familiar* objects guides children's trust in their subsequent labeling of *novel* objects. Indeed, it did, suggesting that at least in the domain of word learning, young children infer a relationship between past and future accuracy.

2.1.1 Semantic versus episodic knowledge domains. Much of this work on children's selective trust is focused on children's evaluations of claims that require some kind of *semantic* knowledge, particularly, object labeling such as in the Koenig et al. (2004) study discussed above. By evaluating "simple" types of semantic knowledge such as naming familiar objects, young children display an ability not only to monitor an informant's track-record of accuracy but also to maintain and apply their understanding of person-specific differences in knowledge when deciding whom to trust (Brosseau-Liard & Birch, 2011). However, accuracy is not a disposition; no informant is all-knowing and always a reliable source of information in every domain.

In situations where a presented claim requires a more specialized type of semantic knowledge (i.e., expertise), by four years of age, children consider the identity of the informant (e.g., doctors and car mechanics) in determining who is more likely to provide an accurate answer to a question (Lutz & Keil, 2002); although, they become better at this as their discipline-based knowledge becomes more fine-tuned with age and education (i.e., formal schooling; Danovitch & Keil, 2004). Yet, regardless of the informant's identity, in "factual" contexts (i.e.

observable reality or "objectively accessible information"; Fedra & Schmidt, under review), there are certain cues to what an informant is likely to know that are specific to the situation at hand. Despite an astrophysicist's expertise in gravity, they must have access to a telescope, for instance, in order to be a reliable epistemic source for *knowing* whether a particular bright spec in the sky is a star or the planet Venus.

Testimony related to an observable reality therefore differs from object labels in the domain of knowledge asserted to the listener. A listener must therefore recognize the different processes required for obtaining such varying forms of knowledge and in turn, apply different strategies for determining the trustworthiness of encountered claims. Testimony related to an observable reality is an assertion of a speaker's knowledge of objectively accessible information. Although objectively accessible, an *appropriate* form of perceptual access to an epistemic source is required to verify the specific content of a given claim. An informant must employ the necessary empirical methods to ensure that the information they later assert to others is in fact reliable. For example, although one may have some form of perceptual access to a given object such as an opportunity for visual inspection, *seeing* this object would not justify a claim about its texture (i.e., whether it is soft or hard); the appropriate form of perceptual access in this case would be the ability to touch or feel the object. It is whether or not the opportunity to perform this specific empirical process (i.e., touching or feeling the object) is seized by the informant that determines the reliability of their subsequent assertion of the object's soft or hard texture. In other words, the trustworthiness of such claims depends on whether or not an informant performed the necessary empirical process to verify their informational

content. Engaging in this empirical process then serves as the means by which the informant acquires relevant *episodic* knowledge that substantiates their claim.

2.1.2 Reliability of the informant and their empirical claim. Prior work has established that when evaluating the validity of empirical claims, it is only between three- to four-years of age that children develop and appropriately apply an epistemological understanding of the causal role that perception (i.e. informational access to an observable reality) plays in knowledge formation (Pratt & Bryant, 1990; Fedra & Schmidt, under review). However, given an informant's access, a critical component to consider is whether prior to making an empirical claim, the informant *chose* to gather the necessary and appropriate supporting evidence. This is to say that the informant exercises agency when verifying that the information they plan to communicate to others is in fact accurate.

There are myriad situations in which empirical claims must be evaluated without the possibility of assessing the validity of an informant's process. In cases where the content of the claim itself is not directly verifiable, the listener can only utilize the identity of the informant themselves to reason about the reliability of their claim. Upon initial introductions to other individuals, social group membership is one of the most immediately available pieces of information. Depending on one's social group membership–for instance, whether they are young or old, male or female, or speak the native language or a foreign language–we might form quick judgments and expectations about the individual, such as their food and music preferences, educational background, or with whom they affiliate. Despite the fact that an informant's group membership is, in most cases, not relevant to whether or not the

empirical claim they communicate is accurate, a listener's trust may be influenced by a motivation to draw favorable characterizations of those whom they themselves affiliate (Billing & Tajfel, 1973).

Indeed, in the absence of other information, young children privilege information from in-group members (Buttelmann et al., 2013; Chen et al. 2013; Elashi & Mills, 2014; MacDonald et al., 2013) and those perceived as similar to themselves (Reyes-Jaquez & Echols, 2013). Yet, around this same age, children also develop an understanding of the connection between one's empirical process and the reliability of their claims (Butler, Gibbs, & Tavassolie, 2018; Butler, Schmidt, Tavassolie, & Gibbs, in revision), demonstrating a consistent preference for informants who fully verify their claims over those who do not or who do so insufficiently. One of the broader goals of the current study was to examine whether young children, in addition to understanding the epistemic consequences of perceptual access, perceive some extent of *social value* in affiliating with those who choose to verify the information they plan to communicate to others.

2.2 Evaluating the Empirical Process

Around the start of pre-school, children begin to show a more nuanced understanding that empirical claims should be based on sufficient evidence from a relevant source. There are particular conditions (i.e., situational circumstances) and processes (i.e., empirical practices) which lead to unearthing accurate information. Thus, an informant's reliability should not only be assessed in terms of their degree of

access to an epistemic source, but whether an informant, further and decidedly, then employs the appropriate methods for obtaining sufficient evidential information.

It is entirely plausible that one may have access to a relevant source and yet fail to appropriately utilize it. By four-years of age, children recognize this caveat; an informant's access to an appropriate epistemic source is a necessary but insufficient condition for their stated empirical claim to be true (e.g., Nurmsoo & Robinson, 2009). For instance, when presented with two informants, one observed to stand on top of a box while the other looks inside the box, Brosseau-Liard and Birch (2011) found that four- and five-year old children endorsed claims made by an informant who previously verified the box's contents by looking inside: the correct evidentiary behavior for supporting a claim about its contents. Despite both informants having access to the relevant information source, children recognized that it is only a particular process that could lead to an accurate claim. Importantly, the claims made by informants who engaged in this particular process were endorsed regardless of their history of providing accurate or inaccurate labeling information (Brosseau-Liard & Birch, 2011).

A previously accurate informant is thus not trusted indiscriminately; children's reasoning about an informant's reliability is informed by both their situational circumstances, of which may or may not afford opportunity to gather sufficient evidence, as well as the *quality* of their chosen empirical method. The process by which a claim is founded in can be evaluated in terms of whether it is likely to yield supporting evidence that is both accurate and adequate in substantiating the given claim. In a recent study conducted in the Cognition and Development Lab,

briefly mentioned earlier, we found that three- to seven-year old children understand that verified claims are more acceptable than those made by informants who fail to verify or who do so insufficiently (Butler et al., in revision). However, the level of sophistication in children's explanations as to why verified claims are more acceptable developed as a function of age.

Children therefore demonstrate, as early as three-years of age, an understanding that it is only particular practices that support justification of a given empirical claim. However, the described findings do not indicate that young children necessarily see *value* in a standard of empirical practices. Our lab's subsequent study addressed this question, examining whether children perceive a relationship between one's empirical practices and their general trustworthiness as a competent teacher from whom a naïve puppet should learn. Children ages three to seven, reasoned that a puppet who verifies evidence is a better source of information and the preferred teacher, compared to a puppet who fails to verify (Butler et al. 2018). The tendency to advise the naïve puppet to look to a teacher who verifies suggests that the *choice* to verify the information one plans to communicate to others is perceived by young children as a valuable and important feature of a trustworthy source.

The discussed findings show that children's understanding of empirical practices that likely result in accurate testimony (i.e., verifying information from a relevant source) is effectively applied to future judgments about reliability. This reviewed research also suggests that children develop value-laden judgements as to the acceptability of stated empirical claims (Butler, et al., in revision) and one's trustworthiness (Butler, et al., 2018) based on the observed empirical practices of an

informant. An open question remains as to whether one's choice to verify the empirical claims they make is perceived by young children as a positive quality of an individual for which they would like to affiliate.

2.3 The Gap in the Developmental Literature

Group membership is shown as particularly salient for early selective social learning. By two-years of age, children begin to privilege information from individuals belonging to particular social groups (e.g., Buttelmann et al., 2013). By the time children reach preschool age, they are more likely to seek or endorse information provided by those who belong to the same social group as themselves, as indicated by their race (Chen et al., 2013), age (Jaswal & Neely, 2006), gender (Shutts, Banaji, Spelke, 2010; Taylor, 2013), accent (Corriveau et al. 2013), or minimal group status (Elashi & Mills, 2014; MacDonald et al., 2013). In particular, shared minimal group membership seems to be weighed differentially than that of familiar social groups. For instance, by the age of four, children's attendance to an informant's history of accuracy overrides the influence of the informant's shared group membership with themselves, as indexed by their age (Jaswal & Neely, 2006), gender (Taylor, 2013), and accent (Corriveau et al., 2013). Whereas, in the case of minimal group membership, children proceed to show no preference for either informant (Elashi & Mills, 2014; MacDonald et al., 2013).

Relatedly, physical (e.g., hair color) and psychological (e.g., food preference) similarity is shown to be correlated to both adults' and children's perception of trustworthiness (e.g., Ziegler & Golbeck, 2007) and in-group favoritism (i.e., the

tendency to favorably characterize the in-group in comparison to the out-group; Billing & Tajfel, 1973). In Reyes-Jaquez' and Echols's (2013) study, for example, in the absence of other information, three-, four-, and five-year old children preferred similar over dissimilar informants as an epistemic source for object labels. When similarity intersected with an informant's prior accuracy, five-year old's, but not three- and four-year old's, became less likely to avoid endorsing a previously inaccurate informant's object labels if they were similar rather than dissimilar.

The research reviewed in this section thus far highlights shared minimal group membership and perceived similarity as particularly salient dimensions by which children select informants. However, this work exclusively focuses on children's use of group membership when making attributions of a particular type of semantic knowledge – object labeling. After thorough review of the available literature, only one study to date seems to have examined how young children weigh an informant's group membership and level of access to empirical evidence in deciding whom to trust. This study found that, irrespective of their gender identification, three- and four-year-old children tend to prefer an informant with access to a relevant evidentiary source (Terrier et al., 2016).

In summary, in "factual" contexts (i.e. observable reality or "objectively accessible information," Fedra & Schmidt, under review), children understand there are certain cues to what an informant is likely to know that are specific to the situation at hand. Further, children apply this understanding, at least in the case of gender, regardless of the informant's group membership (Terrier et al., 2016). Young children's preference to learn from in-group members and those who they perceive as

similar to themselves only manifests absent any information, other than the identity of the informant and their assertions of novel object labels. In certain contexts, children's challenge in evaluating the validity of an empirical claim can be viewed as analogous to the challenges in determining the accuracy of novel object labels. When an empirical claim is presented without additional information about the source or process by which it is substantiated, like an object label, both claims are difficult, if not impossible, to verify by the young child.

Privileging information from in-group members is posited to serve as a facilitator of the transmission of culturally relevant information (Harris, Koenig, Corriveau, & Jaswal, 2018). Trusting an in-group member's novel object label may then serve this function, as this suggests a child's attribution of semantic knowledge (i.e., prescriptive and culturally-shared information). Not represented in current literature however, is whether, in the absence of other information, children treat an in-group member's empirical claim similarly. That is, an open question remains as to whether children are more likely to attribute episodic knowledge to an in-group member if presented with two informants' contradicting empirical claims.

Object-label assertions can only be evaluated based on a standard created through social consensus among agents in defining its meaning and appropriateness in its use and therefore solely transmittable through testimony (McMyler, 2007). The very nature of semantic knowledge is shaped, and its relevance defined, by members of a culture or community (see Diesendruck & Markson, 2011); and thus, inherently holds social value. Episodic knowledge itself is not proposed to hold social value but

rather, the question of interest here is whether the *choice* to verify information prior to making an empirical claim does.

2.4 The Present Studies Rationale and Overview

The primary goal of the current studies is to examine whether children use their expectations related to verification behaviors to inform their attributions of verified and unverified claims to in- and out-group members. Minimal group membership and perceived similarity are shown to be particularly influential in guiding children's trust in an informant's semantic knowledge. The current investigation therefore aims to explore whether children utilize their epistemological understanding of verification behaviors to make inferences about whom they believe is likely to *choose* to verify the information they intend to share with others based on group membership and perceived similarity to others.

These studies focus on 4 to 7-year old children. This age range is of theoretical significance for a number of reasons based in prior research, although none have examined the specific aims of the current study. First, 4-years of age is the youngest at which in-group biases such as explicit preferences for interaction with and perceived similarity to in-group members has been documented (Richter et al., 2016), with stronger effects shown by 5- to 6-year-old children (Dunham, Baron, & Carey, 2011). Also by age 4, children's social preferences are influenced by perceptions of similarity to others, such as sharing particular physical attributes or an attraction to particular foods or toys (e.g., Fawcett & Markson, 2010). Moreover, children at this age make predictions that members of their own in-group share their

preferences for particular activities (Shutts, Roben, & Spelke, 2013) and objects (Richter et al., 2016; Shutts et al., 2013).

By the time children reach preschool age, they are more likely to seek or endorse information provided by those who belong to the same social group as themselves, as indicated by their race (Chen et al., 2013), age (Jaswal & Neely, 2006), gender (Shutts, Banaji, Spelke, 2010; Taylor, 2013), accent (Corriveau et al. 2013), or minimal group status (Elashi & Mills, 2014; MacDonald et al., 2013). Children also tend to favor similar over dissimilar informants (Reyes-Jaquez & Echols, 2013).

Second, the critical developments in children's social cognitive capacities during this period (i.e. four- to seven- years of age) go beyond basic theory of mind – an understanding of mental states and the processes of knowledge acquisition (Kuhn, Cheney & Weinstock, 2000; Miller, Hardin, & Montgomery, 2003; Wellman, Cross & Watson, 2001). As early as three-years of age, children begin to incorporate a normative stance when learning from others (Rakoczy & Schmidt, 2013). A normative stance refers to the inductive lens through which observed regularities are understood as generic prescriptions and proscriptions of how others *ought* to behave. Children show a developing ability to both form and enforce normative expectations of others (Rokoczy, Warneken, & Tomasello, 2008). Prior research also suggests that young children are even prone to *over*interpreting an observation of a singular arbitrary action – ascribing such an action as an objective normative rule that applies to everyone (Schmidt, Butler, Heinz, & Tomasello, 2016).

Schmidt et. al's (2016) study, for instance, found that, even in the absence of explicit normative cues, three-year old children were quick to ascribe normativity to an agent's actions so long as they were performed intentionally. There is also some evidence suggesting that children hold those with whom they affiliate to a higher standard–selectively protesting conventional norm transgressions made by in-group members over those of out-group members (Schmidt, Rakoczy, & Tomasello, 2012). Again, however, these studies examine children's ascription and enforcement of normative rules to conventional-type behaviors – such as when playing a board game and moving a token to a specific place in a particular way (Rakoczy & Schmidt, 2013) or using familiar and novel artifacts in atypical ways (Casler, Terziyan, & Greene, 2009).

Along the same lines, a great deal of prior work on selective trust concentrates on children's evaluations of an informant's knowledge or ignorance of the conventional use of language (i.e., labeling of familiar objects). Normative expectations for individuals to act in accordance with conventions, like the use of culturally and linguistically prescribed object labels, are to some degree arbitrarily ascribed. Conventional knowledge is not naturally available or verifiable as self-evident or objectively true like knowledge claims related to an observable reality. Children's trust in an informant is posited to be particularly sensitive to testimonial errors in the semantic domain because of conventional information's defining feature; namely, that it is culturally shared, facilitating clear communication among members of a cultural community (Stephens & Koenig, 2015). Conventional knowledge such

as objects labels are presupposed to be known by all those who share group membership and thus, semantic claims are themselves normative.

Although empirical (i.e., verifiable) claims are not themselves normative, it is plausible that children begin to incorporate a normative stance towards forming expectations of one's *epistemic certainty* when making an empirical claim. The epistemic certainty norm for assertions refers to the idea that when a speaker asserts something (e.g., empirical claim), they take on the commitment of transmitting this knowledge to the listener and thus, ought to adhere to greater requirements than that of a full belief (Stanley, 2008). In order to be epistemically "certain" of an empirical claim, the speaker must *know*, or be in the position to *know*, this information on the basis of sufficient evidence, providing them with the highest degree of justification for their statement.

Butler et al.'s (in revision) study did not directly examine young children's reasoning about verified claims from a normative perspective. However, the study's findings reveal that between three- to four-years of age children begin to understand that verified claims are more acceptable than unverified claims. Children's tendency to rate claims that are fully verified as more "okay" than those that are insufficiently or not at all verified, could suggest that children judged the speaker's assertion as normatively acceptable based on the inferred epistemic certainty of the informant. In other words, children could have interpreted the experimenter's questions as to how "okay" or "not okay" a given claim was in a normative light. If so, their ratings of fully verified claims as more "okay" can suggest an expectation that people ought to verify the information they assert to others. The fact that children also are shown to

identify an agent who verifies evidence as a better source of information and the preferred teacher when compared to one who fails to verify can also be interpreted as indirect evidence in support of this notion (Butler et al., 2018).

Thus, there are two theoretical perspectives guiding the hypotheses for the current studies. One possibility is that young children perceive some extent of social value in the choice to verify the information one plans to communicate to others. Another possibility, while not negating the first, is that young children incorporate normative expectations as to the conditions under which it is acceptable to make an empirical claim. Regarding the first perspective and as previously discussed, prior research has established that children are inclined towards drawing social comparisons that positively differentiate their minimal in-group members from minimal out-group members (Baron & Dunham, 2015; Dunham et al., 2011; Dunham & Emory, 2014; Spielman, 2000). Therefore, it was predicted that if the *choice* to verify information prior to making an empirical claim holds some extent of social value then children may be more likely to attribute verified claims to in-group members or those perceived as similar to themselves.

In relation to the second perspective, it is important to note that the current study does not directly test whether children hold an expectation of a speaker's adherence to a norm of epistemic certainty. Nevertheless, it was hypothesized that if children do hold such an expectation, then a speaker who proceeds to make an empirical claim without verifying its informational content would be seen as less acceptable. Based on this view, children were predicted to be more likely to make

attributions of unverified claims to out-group members or those perceived as dissimilar to themselves.

Along the same lines, children may also hold those with whom they affiliate to a higher standard (e.g., Schmidt, Rakoczy, & Tomasello, 2012), expecting in-group members' knowledge of and adherence to the epistemic certainty norm at greater levels than members of their out-group; thus, children may be more likely to make attributions of verified claims to members of their in-group. However, it is also plausible that children generalize their expectation of epistemic certainty to all individuals who make an empirical claim, irrespective of group affiliation. In this case, children would be just as likely to make attributions of verified claims to in-group members than they would to out-group members.

The current studies will lay groundwork for an important line of future research. Namely, this investigation will shed light as to whether children utilize their epistemological understanding of verification behaviors to make inferences about whom they believe is likely to *choose* to verify the information they intend to share with others based on their own social affiliations (i.e. shared group membership and perceived similarity to others).

Chapter 3: Pilot Experiment

3.1 Method

3.1.1 Participants

A sample of 36 four- to seven-year-old children participated in this experiment of which there were 9 four-year-olds (M=4;7, range=4;1- 4;11 ; 6 female and 3 male), 12 five-year-olds (M=5;5, range=5;0-5;11 ; 6 female and 6 male), 8 six-year-olds (M=6;4, range=6;0-6;11 ; 6 female and 2 male), and 7 seven-year-olds (M=7;5, range=7;0-7;11 ; 3 female and 4 male). Participants were recruited from the children's museum and only those whose parents had given their consent were included in the study. Participants' ethnicity information was reported by a parent upon completing the consent form, of which 20 (56%) identified as Caucasian /White, 6 (17%) as African-American or Black, 2 (5.5%) identified as Hispanic or Latino, 1 (3%) as Asian or Pacific Islander, 5 (14%) as Biracial/Mixed Race, and 1 (3%) was unreported. Each child was tested individually by a single experimenter for about 10-15 minutes. An additional 2 participants (1 female and 1 male) were tested but excluded from the final sample, one due to an experimenter's mistake and one due to an incomplete parental consent form.

3.1.2 Setup and Materials

Trained experimenters invited each child to participate in an experimental session and directed them to a quiet space designated by the research staff at the Port Discovery museum. Informed consent was obtained from each child's parents prior to

beginning the session. Parents were then asked to quietly wait in the general vicinity of the testing space and were told that they may observe the session.

The area in which the experimental session took place contained one video camera with its stand, two chairs (one for the child and the other for the experimenter), and a table for the study materials. The experimenter sat perpendicular to the participant's seat that directly faced a 13-inch laptop screen. The video camera was set up adjacent to the child's seat to focus to the recording on which particular stimuli the child points to during the session. The orange and green group markers used for the minimal group manipulation included: an armband, sticker, and solid-color bandana. Children drew one colored coin for their minimal group assignment from a small grey bucket that held 200 plastic circular counters-chips, half of which were green, and the other half were orange. Participant responses for each of the three measures were recorded by the experimenter on a form which included the experimenter's script, specifically designated for each of the 12 orders.

3.1.3 Design

The stimuli presented to participant as representing in-group and out-group members were drawings of Caucasian/White children, whose appearance only differed in hair color and whether they wore orange or green group markers. In order to prevent any possible effects of gender or particular hair color preferences, all stimuli matched participants' gender and further, in-group and out-group member dyads were always presented as identical in hair color. Thus, all stimuli pairs were only distinguishable by their respective group color markers. Child participants were randomly assigned to one of the 12 orders of a computer slideshow, with eight

participants allocated to each order, of which two participants (one female and one male) from each age group were assigned. Among the 12 orders, half of the digital slideshows presented a demonstration of a single child-stimuli drawing a green-colored coin prior to another single child-stimuli drawing an orange-colored coin, while the remaining orders showed the reversed (see procedure details below). The otherwise identical, in-group and out-group member dyads, were presented in counterbalanced order across participants and trials.

3.1.4 Procedure

The experiment procedure closely followed Richter et al.'s (2016) procedure in the minimal group induction and both the explicit attitude and shared preference measures; while, the behavioral attribution measure was adapted for the goals of this study.

3.1.4.1 Minimal-group Induction

The experimenter introduced participants' minimal group assignment by first telling a story with supporting visuals about two other children who each "blindly" drew a colored coin from a bucket to determine their group membership. Following the child-stimulus group assignment, the experimenter explained that each child-stimuli would now wear three group markers, in their respective group color, including: (1) an armband, (2) a solid-color rectangular sticker, and (3) a solid-color scarf. In order to make group distinctions salient, participants then viewed other drawings of individual children belonging to the green and orange groups. Upon viewing a single orange or green minimal-group member, the experimenter asked each participant which group the child belongs to, for a total of five rounds.

Participants must have correctly identified the presented stimuli's group membership on at least four out of the five trials for their data to be used in the analyses. All 36 participants correctly identified group membership of the presented stimuli on each of the five trials.

Next, participants drew a green or orange colored-coin from a grey bucket similar to the one pictured in the stimulus demonstration. Once the participant identified which color coin they drew, they were provided with the three group markers in their respective group color to be worn. To confirm children's recognition of their own membership in the green or orange minimal-group, the participant then viewed both two groups of children. A group of children belonging to the green minimal-group and well as a group of children belonging to the orange minimal-group were presented adjacent to one another on the laptop screen and children were asked to point to and identify the color of which group they belong. The child then proceeded to the group affiliation measures described in the next section. Following completion of all three measures, the experimenter thanked the child for their participation and announced the end of the game.

3.2 Measures

3.2.1 Explicit Attitude

Participants were shown a series of pictures of other children on the lap-top screen and instructed to point to which child they like better or would like to play with if they had the chance. There were five trials, each of which presented two group members, one of which belonged to the child's in-group and the other to the child's

out-group. The experimenter recorded whether the child preferred an in-group member (coded as "1") or whether they preferred an out-group member (coded as "0") for each of the five trials. The total number of trials each child chose an in-group member was also recorded (range = 0 – 5).

3.2.2 Shared Preference

Participants were presented with object pairs belonging to the same category and instructed to point to which object they like better (e.g., airplane and train; see Table 1 on the following page). Following their selection, the participant's preferred choice appeared in the center of a stimuli pair, depicting one in-group and one out-group member. The experimenter then asked, "Who do you think *also* likes [object preference] better?" Participants were instructed to point to one of the group members viewed on the screen in response to the posed question (see Figure 1 on the following page). The experimenter recorded whether children's preferred choice was an in-group member (coded as "1") or an out-group member (coded as "0"). The total number of trials each child chose an in-group member was also recorded (range = 0 – 5).

Table 1. *Test Stimuli for Shared Preference Task*

Trial	Stimuli	Question
1		Which do you like better, apples or bananas?
2		Which do you like better, dogs or cats?
3		Which do you like better, airplanes or trains?
4		Which do you like better, milk or juice?
5		Which do you like better, vanilla or chocolate ice cream?

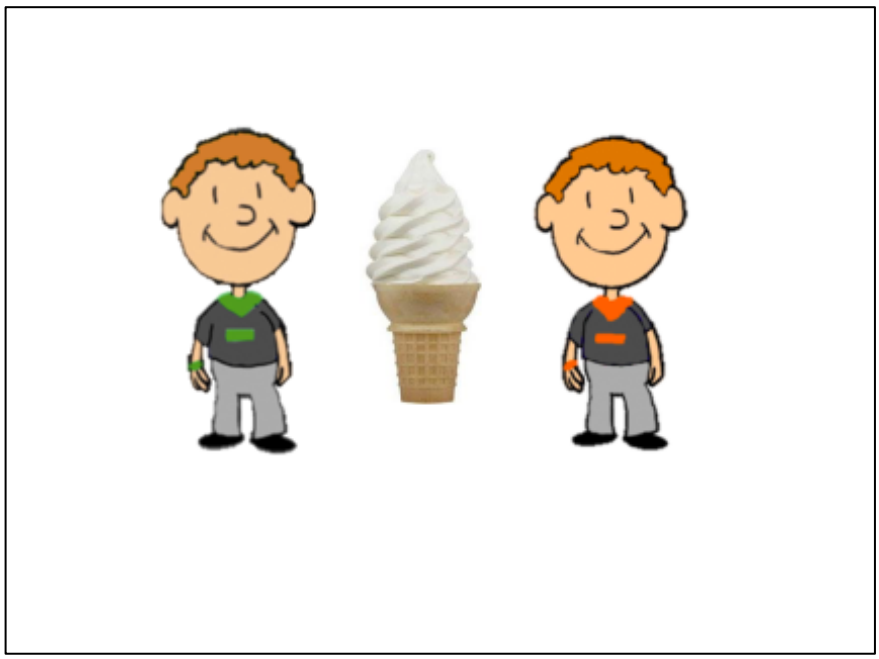

Figure 1. *Sample Stimuli Pair for Shared Preferences Task*

3.2.3 Behavioral attribution

The experimenter informed participants that they will hear about "some things that happened" and that their job is to point to which group member they think "did that". The experimenter presented a total of eight vignettes, in which each described an unidentified individual expresses curiosity relating to the contents or properties of a particular thing and concludes with this individual making a verifiable claim about their object of curiosity. However, the individuals' empirical practices differ among the presented items. Following their expressed curiosity, four of the vignettes describe an individual who verifies information from a relevant source prior to making a claim (verified condition) while the other four vignettes describe an individual who proceeds to make a claim without verifying its informational content (unverified condition). Trained experimenters took great care to display a neutral disposition, both in their body language and verbal delivery of each task item. In doing so, the experimenter could avoid the potential influence of a participant's perception of the actions or inactions described in each item as being viewed positively or negatively by the experimenter.

In four of the eight trials, the experimenter described an individual who wonders about the contents of a particular container (i.e. box, classroom door, backpack, and bottle), and who then continues to look or not look inside the container prior to making a claim about its contents (see Table 2 for "container" behavioral attribution items). In the remaining four trials, rather than presenting situations in which "looking" inside something is required for verification, the experimenter describes other types of instances where an individual has an opportunity to obtain

appropriate evidence in support of their claim (see Table 3 for "non-container" behavioral attribution items). Upon viewing a pair of in- and out-group member stimuli, the experimenter instructed the participant to point to which target they believe made the verified or unverified claim (see Figure 2 below). The experimenter then recorded the child's selection for each of the eight trials. Children's selections in the verified condition were coded as "1" for in-group members and "0" for out-group members. For the unverified condition, children's selections were coded as "1" for out-group members and "0" for in-group members.

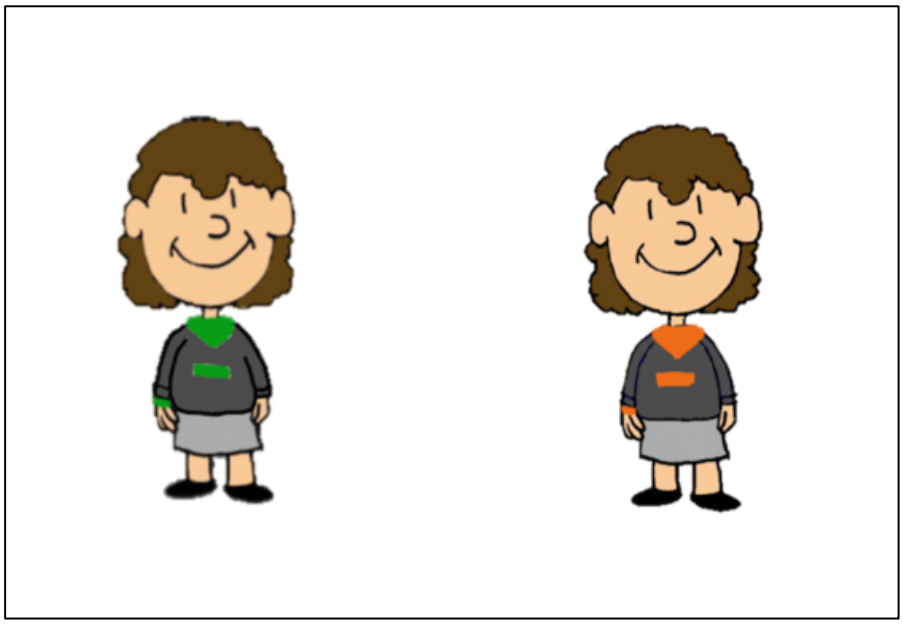

Figure 2. *Sample Stimuli Pair for Behavioral Attribution Task*

Table 2. *Behavioral Attribution Task Test Stimuli – Container Items*

Trial	Test Stimuli	Scenario		Question
		Verified	Unverified	
1		Today, someone found a box and wondered what was in it. Then, they looked in the box and said there are crayons in the box!	Today, someone found a box and wondered what was in it. Then, they did not look in the box and said there are crayons in the box!	Who do you think [did not] looked inside the box before saying there are crayons inside it?
2		Today, someone was walking by a classroom and wondered what the class was doing. Then, they looked inside and said the class is reading!	Today, someone was walking by a classroom and wondered what the class was doing. Then, they did not look inside and said the class is reading!	Who do you think [did not] looked inside the classroom before saying the class was reading?
3		Today, someone found a backpack and wondered what was in it. Then, they looked in the backpack and said there is a football inside!	Today, someone found a backpack and wondered what was in it. Then, they did not look in the backpack and said there is a football inside!	Who do you think [did not] looked inside the backpack before saying there is a football inside?
4		Today, someone found a bottle and wondered what was in it. Then, they opened the bottle and said there is a milkshake inside!	Today, someone found a bottle and wondered what was in it. Then, they did not open the bottle and said there is a milkshake inside!	Who do you think [did not] opened the bottle before saying there is a milkshake inside?

Table 3. *Behavioral Attribution Task Test Stimuli – Non-Container Items*

Trial	Test Stimuli	Scenario		Question
		Verified	Unverified	
1		Today, someone got a new toy and wondered if it would sink or float. Then, they put the new toy in water and said it floats!	Today, someone got a new toy and wondered if it would sink or float. Then, they did not put the new toy in water and said it floats!	Who do you think [did not] put the new toy in water before saying it floats?
2		Today, someone found two balls and wondered which one rolls faster down the ramp. Then, they dropped both balls down the ramp and said the yellow one rolled faster!	Today, someone found two balls and wondered which one rolls faster down the ramp. Then, they did not drop both balls down the ramp and said the yellow one rolled faster!	Who do you think [did not] dropped both balls down the ramp before saying the yellow ball rolled faster?
3		Today, someone found a jar of gummy bears and wondered how many were inside. Then, they counted all the gummy bears and said there are 52 gummy bears inside!	Today, someone found a jar of gummy bears and wondered how many were inside. Then, they did not count all the gummy bears and said there are 52 gummy bears inside!	Who do you think [did not] counted the gummy bears inside the jar before saying there are 52 gummy bears inside?
4		Today, someone found two suitcases and wondered which one was heavier. Then, they picked both suitcases up and said the red one is heavier!	Today, someone found two suitcases and wondered which one was heavier. Then, they did not pick both suitcases up and said the red one is heavier!	Who do you think [did not] picked both suitcases up before saying the red suitcase is heavier?

3.3 Results

3.3.1 Explicit Attitude

A repeated-measures analysis of variance (ANOVA) with trial as the within subject variable and with age (4, 5, 6, and 7 years of age) and gender as the between-subjects variables revealed no main effect or interactions among these factor variables. The number of times children preferred an in-group member over an out-group member were collapsed across trial, age group, and gender for subsequent analyses. Replicating results from Richter et al. (2016), children showed a significant preference for in-group members across trials, $M = 3.25$, $t(35) = 2.728$, $p = .01$, $d = 0.46$ (two-tailed).

3.3.2 Shared Preference

Next, for the shared preference task responses, a repeated-measures ANOVA with trial as the within subject variable and with age and gender as the between-subjects variables was conducted and revealed no main effect or interactions among these factor variables. The number of times children ascribed similar preferences to an in-group member versus an out-group member was collapsed across trial, age group, and gender for the following analyses. Further replicating results from Richter et al. (2016), children's selections revealed perceived similarity to in-group members across trials significantly above chance, $M=3.19$, $t(35)=2.79$, $p < .01$, $d = 0.46$ (two-tailed).

3.3.3 Behavioral Attributions

For children's responses on the behavioral attribution measure, the total number of trials children made attributions of verified claims to in-group members and attributions of unverified claims to out-group members will be referred to in the reporting of subsequent analyses as *bias-consistent* responses. A repeated-measures ANOVA with condition (verified versus unverified claims) and trial as the within subject variables and age (4, 5, 6, and 7 years of age) and gender as the between-subjects variables was tested and revealed no main effect of trial or condition, nor any interactions among the entered variables. The number of bias-consistent responses were then collapsed across both verified and unverified conditions as well as across trial, age, and gender. Results revealed that children's selections were consistent with predicted group biases significantly above chance, $M = 4.83$, $t(35) = 2.74$, $p < .05$, $d = 0.46$ (two-tailed).

To further clarify the results above revealing a tendency for selecting bias-consistent responses across both verified and unverified conditions in the behavioral attributions task, the following responses were separated and used as independent variables for further analysis: 1) number of in-group member selections in the verified condition (range = 0 – 4); and 2) number of out-group member selections in the unverified condition (range = 0 – 4). Results revealed that children made attributions of verified claims to in-group members significantly above chance, $M = 2.64$, $SD = 1.15$), $t(35)=3.33$, $p < .01$, $d = 0.56$ (two-tailed). Whereas, children made attributions of unverified claims to out-group members at levels of chance, $M = 2.19$, $t(35) = 0.88$, $p = .39$, $d = 0.15$ (two-tailed).

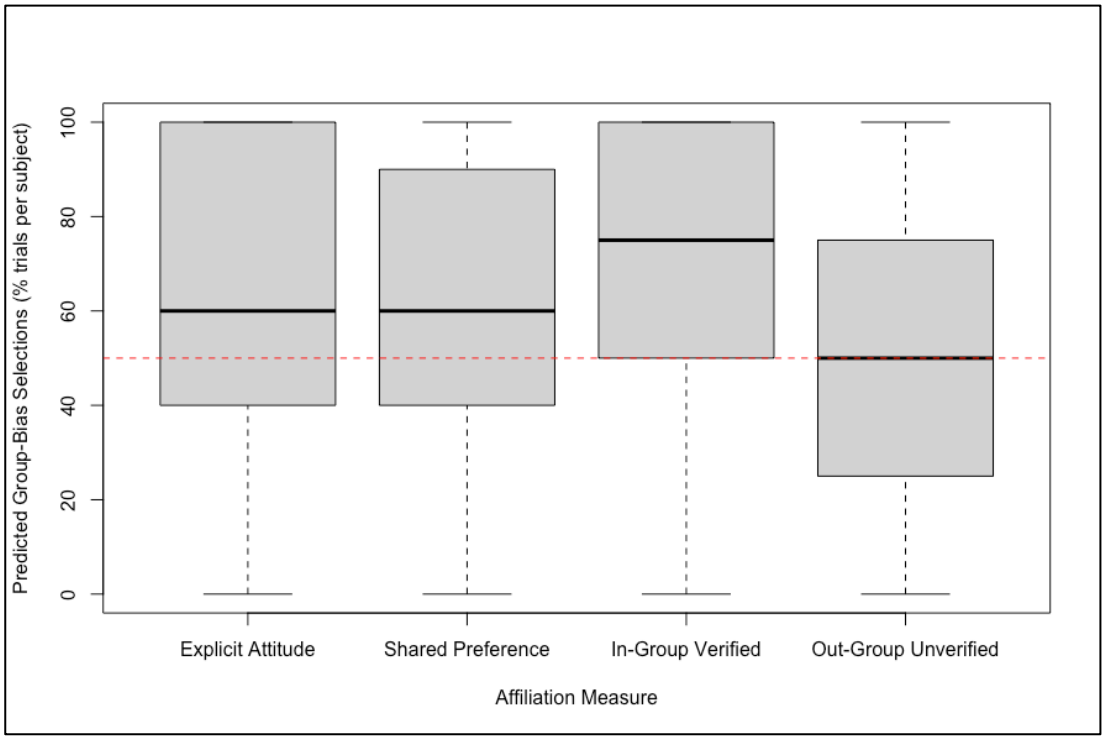

Figure 3. *Response distribution of predicted group-bias selections.* The box and whisker plots show children's responses across the three administered group affiliation measures; however, the behavioral attributions shown are separated by condition (i.e. in-group member selections in the verified condition and out-group member selections in the unverified condition). The boxes indicate the first and fourth quartiles and the solid lines inside the boxes represent the medians. The dashed lines capture the location of extreme values. The horizontal, red dashed line indicates the chance level (50%).

3.3.4 Relationship Among Variables

3.3.4.1 Explicit Attitudes and Behavioral Attributions

A Pearson's correlation coefficient was calculated to examine individual differences in explicit attitudes towards in-group members and participants' bias-consistent responses on the behavior attribution task. The relationship among children's explicit social preference for in-group members and their bias-consistent selections was marginally statistically significant, $r = .33$, $p = .05$. Next, the relation among children's preferences for in-group members on the explicit attitude task and

in-group member selections in the verified condition as well as out-group member selections in the unverified condition was further examined. The correlation among attributions of verified claims to in-group members and explicit social preferences for in-group members approached significance, $r = .27$, $p = .056$. Yet, there was no significant relation among children's attribution of unverified claims to out-group members and their social preferences for in-group members, $r = .22$, $p = .098$.

3.3.4.2 Ascriptions of Shared Preferences and Behavioral Attributions

Individual differences in children's ascriptions of similar preferences as their own to in-group members was then examined in relation to participants' bias-consistent responses on the behavior attribution task. The relationship among children's perceived similarity to in-group members and their bias-consistent selections was not statistically significant, $r = .237$, $p = .165$. Further, there was no significant relation among children's ascriptions of interpersonal similarity to in-group members and their attributions of verified claims to in-group members, $r = .159$, $p = .355$. The relationship between children's ascriptions of interpersonal similarity to in-group members and their attributions of unverified claims to out-group members was also not statistically significant, $r = .188$, $p = .272$.

3.4 Discussion

This investigation tested a small sample of children and therefore, interpretations of these results are not intended to be presented as precise and generalizable representations of the population. However, the results of this Pilot Experiment provide preliminary support for the prediction that children perceive

some extent of social value in affiliating with those who choose to verify the information they assert to others. Children's affiliation with a particular group seemed to have guided whom they made attributions of verified, but not unverified, claims. Specifically, children were inclined to make attributions of verified claims to in-group members; however, they were just as likely to make attributions of unverified claims to in-group members than they were to out-group members.

Replicating Richter et al.'s (2016) findings, children showed a significant preference for and tendency to ascribe interpersonal similarity to in-group members. Yet, only children's social preferences for in-group members, not children's perceived similarity to them, seemed to guide predictions of group members' standards of empirical practice. Children's explicit social preference for (i.e. greater "liking" of) in-group members was found to be significantly related, albeit marginally so, to their attributions of verified and unverified claims that are consistent with the predicted group biases. This relationship was mostly maintained by children's significant inclination to make attributions of verified claims to in-group members, as they did not demonstrate a tendency to make attributions of unverified claims to out-group members.

This particular finding can be interpreted as preliminary support for the prediction that children hold an expectation of a certain standard of empirical practices for those whom they affiliate (e.g., Schmidt et al., 2012), and further, that one's *choice* to verify is perceived as a positive quality of an individual for which they would like to affiliate. Not predicted, however, was children's seeming lack of an expectation for out-group members' choice or failure to verify evidence prior to

their professed empirical claim. Although lacking such an expectation is consistent with prior research suggesting young children's difficulty in attributing mental states to out-group members (Mcloughlin & Over, 2017).

As discussed earlier, the small sample size in this Pilot Experiment is a critically restrictive factor in being able to reliably interpret these results. The number of participants was limited to what is reported here because of the possibility that the presented stimuli differentially influenced children's perception of social affiliation. All children, regardless of race or ethnic background, were presented with drawings of Caucasian/White children as representation of their in-group and out-group members. Despite the fact that participants wore the same group markers (i.e., green or orange colored armband, scarf, and sticker) as the presented stimuli, the degree to which children identified with their minimal group members may have been influenced by an attendance to their apparent racial background.

In the Main Experiment, therefore, the stimulus was altered so as to appear racially ambiguous. This modification was made so that participants' perception of social affiliation to the child drawings, intended to represent participants' in- and out-group members, could only be influenced by the minimal group categorizations themselves, rather than confounded by whether or not participants share the stimulus' racial background. In the original stimulus, group member dyads were shown has having either black, dark brown, light brown, blonde, or red matching hair color. Pairs of group members were always presented with identical hair color, so that the color of their group markers was the sole distinguishing feature between the two

group members. In order for the stimulus to appear as racially ambiguous, the skin tone was altered but still remained uniform among all group members.

The original stimuli's varying hair colors was primarily used to ensure that members of each group appeared as distinct individuals; however, to further ensure racial ambiguity, group member dyads' hair colors were comprised of slight variations of brown and black. Because the new hair colors were not as distinct from one another as the original stimulus, some of the group member dyads were given glasses and freckles to strengthen their appearance as clearly distinct individuals. The key contrast among in-group and out-group member dyads remained their minimal group color markers in the Main Experiment.

Chapter 4: Main Experiment

4.1 Method

4.1.1 Participants

A sample of 96 four- to seven-year-old children participated in this experiment of which there were 24 four-year-olds (M=4;6, range=4;0-4;10; 12 female and 12 male), 24 five-year-olds (M=5;5, range=5;0-5;11 ; 12 female and 12 male), 24 six-year-olds (M=6;5, range=6;0-6;11, 12 female and 12 male), and 24 seven-year-olds (M=7;5, range=7;1-7;11 ; 12 female and 12 male). Among the full sample, 87 children were recruited both from the children's museum while the remaining nine participants were recruited from a database of families who had previously expressed interest in research participation at the University of Maryland. Only children whose parents had given their consent were included in the study. Participants' ethnicity information was reported by a parent upon completing the consent form, of which 63 (i.e., 66%) identified as Caucasian /White, 11 (i.e., 11.5%) as African-American or Black, 3 (i.e., 3%) as Hispanic or Latino, 9 (9.4%) as Asian or Pacific Islander, 9 (9.4%) as Biracial/Mixed Race, and 1 (1%) was unreported. Each child was tested individually by a single experimenter for about 10-15 minutes.

An additional 14 children (7 females and 7 males) were tested but excluded from the final sample. Among the excluded children, six were excluded due to explicit statements identifying either green or orange as their favorite color, one due to ending the session early and parent informing the experimenter of the child's developmental delay, and one due to parent interference. The remaining six children

were excluded due to the experimenter presenting the wrong order of the slideshow and thus, were considered "extra" and dropped from subsequent analyses using the pre-determined sample size of 96 participants.

4.1.2 Setup and Materials

The setup of the physical space in which the experimental session took place as well as the materials were identical to that of the Pilot Experiment.

4.1.3 Design

The experimental design for Main Experiment matched that of Pilot Experiment, with one exception. The in-group and out-group member stimuli were altered to appear racially ambiguous.

4.1.4 Procedure

The Main Experiment adopted the procedure followed by the Pilot Experiment, using the altered stimuli described above for the minimal-group induction and all tasks that followed.

4.1.5 Measures

4.1.5.1 Explicit Attitude

The explicit attitude measure was identical to that of the Pilot Experiment. However, when participants were instructed to point to which child they liked better, they viewed the altered stimuli in-group and out-group member dyads (see Figure 4).

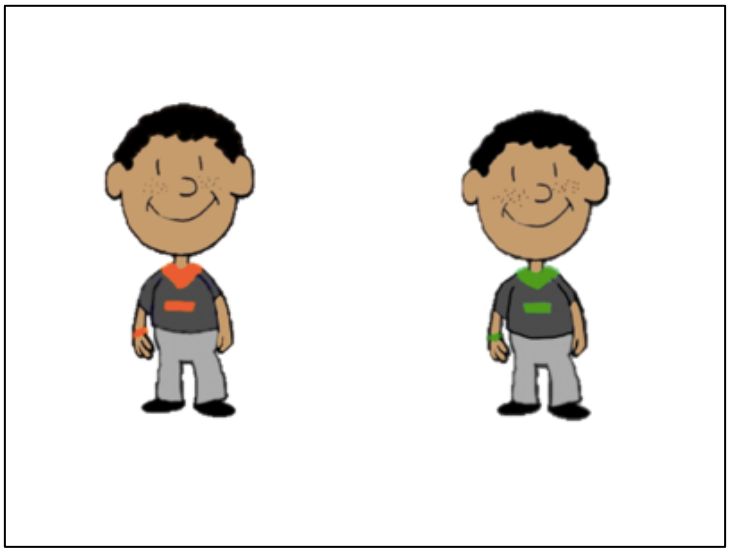

Figure 4. *Sample Stimuli Pair for Explicit Attitude Task*

The shared preference task was also identical to that of Pilot Experiment, using the same test stimuli shown in Table 1 with one exception. The fifth item shown in Table 1 was changed; participants were instead presented with a picture of a vanilla and strawberry ice cream cone and the experimenter's question that followed identification of their preferred choice was appropriately revised (see Table 3). Children were also shown altered stimuli pairs when asked to ascribe their preferred choice to a group member (See Figure 4).

Table 4. *Revised Item for Shared Preference Task*

5		Which do you like better, vanilla or strawberry ice cream?

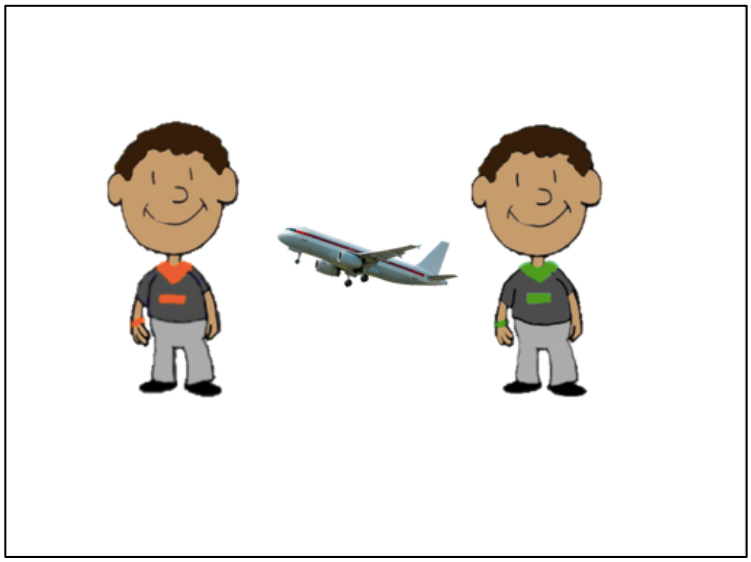

Figure 5. *Sample Stimuli Pair for Shared Preference Task*

4.1.5.3 Behavioral Attributions

The presented test stimuli and scenarios for the behavioral attributions task was identical to that of Pilot Experiment, except for children viewing the altered stimuli pairs when instructed to point to which group member they attribute the verified or unverified claim (see Figure 5 on the follow page).

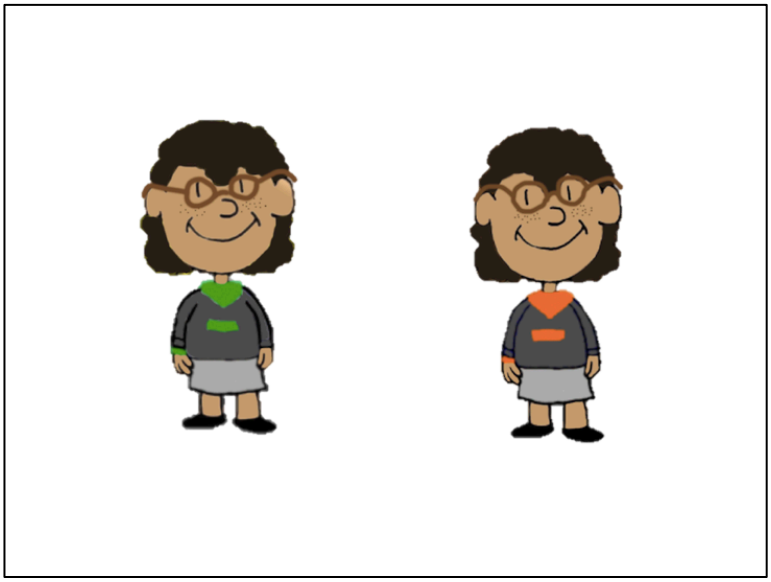

Figure 6. *Sample Stimuli Pair for Behavioral Attribution Task*

4.1.6 Results

4.1.6.1 Explicit Attitude

A repeated-measures analysis of variance (ANOVA) with trial as the within subject variable and with age (4, 5, 6, and 7 years of age) and gender as the between-subjects variables revealed no main effect or interactions among these factor variables. The number of times children preferred an in-group member over an out-group member were collapsed across trial, age group, and gender for subsequent analyses. Results reveal that children showed a significant preference for in-group members across trials, $M = 3.25$, $t(95) = 4.723$, $p < 0.001$, $d = 0.48$ (two-tailed).

4.1.6.2 Shared Preference

Next, for the shared preference task responses, a repeated-measures ANOVA with trial as the within subject variable and with age and gender as the between-subjects variables was conducted and revealed no main effect or interactions among these factor variables. The number of times children ascribed similar preferences to an in-group member versus an out-group member was collapsed across trial, age group, and gender for the following analysis. Children's selections revealed perceived similarity to in-group members across trials significantly above chance, $M = 3.18$, $SD = 1.34$), $t(95) = 2.79$, $p < 0.001$, $d = 0.51$ (two-tailed).

4.1.6.3 Behavioral Attributions

A repeated-measures ANOVA with condition (verified versus unverified claims) and trial as the within subject variables and age (4, 5, 6, and 7 years of age)

and gender as the between-subjects variables revealed no main effect of trial or condition, nor any interactions among the entered variables. The number of bias-consistent responses were therefore collapsed across both verified and unverified conditions as well as across trial, age, and gender for the following analysis. Unlike the Pilot Experiment, children assigned verified and unverified claims consistent with predicted group biases on 50% of the trials, that is, chance performance, $M = 4.02$, $t(95) = 0.12$, $p = 0.91$, $d = 0.01$ (two-tailed).

To further clarify children's responses across both verified and unverified conditions in the behavioral attributions task, attributions of verified claims to in-group members and attributions of unverified claims to out-group members were separated and used as independent variables for the following analyses. Results revealed that children made attributions of verified claims to in-group members 53% of the time, which does not significantly differ from chance performance, $M = 2.09$, $t(95) = 0.77$, $p = 0.45$, $d = 0.08$ (two-tailed). Similarly, children made attributions of unverified claims to out-group members 48% of the time, which also does not significantly differ from chance, $M = 1.93$, $t(95) = -0.57$, $p = 0.57$, $d = -0.06$ (two-tailed).

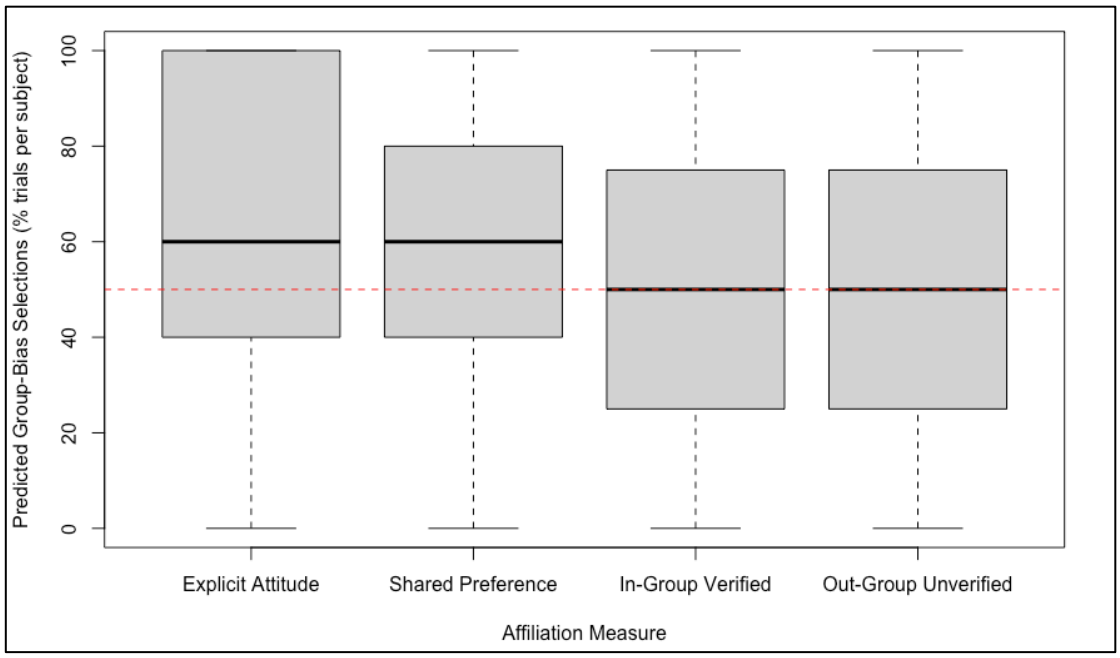

Figure 7. *Response distribution of predicted group bias-selections.* The box and whisker plots show children's responses across the three administered group affiliation measures; however, the behavioral attributions shown are separated by condition (i.e. in-group member selections in the verified condition and out-group member selections in the unverified condition). The boxes indicate the first and fourth quartiles and the solid lines inside the boxes represent the medians. The dashed lines capture the location of extreme values. The horizontal, red dashed line indicates the chance level (50%).

4.1.6.4 Relationship Among Variables

4.1.6.4.1 Explicit Attitudes and Behavioral Attributions

A Pearson's correlation coefficient was calculated to examine individual differences in participants' favoring of in-group members and their bias-consistent responses on the behavior attribution task. The relationship among children's social preference for in-group members and their bias-consistent selections was not significant, $r = .34$, $p = .74$. Next, the relation among children's social preference for in-group members and attributions of verified and unverified claims were examined separately. The correlation among children's attributions of verified claims to in-

group members and their social preferences for in-group members was not significant, $r = .13$, $p = .19$. Likewise, the correlation between children's attribution of unverified claims to out-group members and their social preferences for in-group members did not indicate a significant relationship, $r = -.08$, $p = .42$.

4.1.6.4.2 Ascriptions of Shared Preferences and Behavioral Attributions

Individual differences in children's ascriptions of similar preferences as their own to in-group members was then examined in relation to participants' bias-consistent responses on the behavior attribution task. The relationship among children's perceived similarity to in-group members and their bias-consistent selections was not statistically significant, $r = .17$, $p = .09$. However, there was a significant relation among children's ascriptions of interpersonal similarity to in-group members and their attributions of verified claims to in-group members, $r = .30$, $p < 0.01$. The relationship between children's in-group member selections on the shared preference task and their attributions of unverified claims to out-group members was also investigated, however, the correlation among these variables proved insignificant, $r = -.05$, $p = .64$.

4.1.7 Discussion

The results from this Main Experiment diverge from the initial trends shown in the Pilot Experiment. Children's attributions of both verified and unverified claims that were consistent with predicted group-biases, did not differ from chance. This pattern held when both types of attributions are analyzed separately by condition. Children were just as likely to predict that an in-group member made a verified claim

as they were an out-group member. Likewise, children were just as likely to make attributions of unverified claims to an out-group member as they were to an in-group member.

Further replicating prior work, children demonstrated a significant preference for in-group members on the explicit attitude task (e.g., Richter et al., 2016); however, their social preferences did not predict their attributions of verified claims to in-group members, nor their attributions of unverified claims to out-group members in the behavioral attributions task. Also in line with previous work cited above, children tended to ascribe similar preferences as their own to in-group members. This trend did in fact relate to children's tendency to make attributions of verified claims to in-group members, but not to their attributions of unverified claims to out-group members.

Overall, we did not find evidence of children's epistemological understanding of verification behaviors as informing their inferences about group membership. Specifically, children did not seem to differentially attribute verification behaviors to members of their in-group than to those of their out-group. Although, those who held perceptions of in-group members as similar to themselves also tended to attribute verified claims to in-group members. It is the possibility that this particular finding supports the hypothesis that children perceive one's choice to verify as a positive quality of an individual for which they would like to affiliate. As children understand that verifying evidence from a relevant source is required to yield relevant episodic knowledge (e.g., Nurmsoo & Robinson, 2009; Butler et al., 2018), they may have been more likely to envision themselves or someone "similar" to themselves as the

described individual in the verified condition. Yet, this explanation is only speculation; it is difficult to interpret the significance of this relationship, given that despite children's significant inclination to ascribe similarity to in-group members, their overall tendency to attribute verified claims to in-group members was at chance.

Chapter 5: General Discussion

Achieving scientific literacy is to understand the scientific ways of knowing (Maienschein, 1999). To promote young children's development of such an understanding requires an emphasis on the *process* of acquiring knowledge, producing skeptical habits of mind and a willingness to revise beliefs when faced with new evidence (Maienschein, 1999; Nelson, 1999). The development and importance of these habits is typically described in reference to taking a critical stance towards the information presented by others. We rely a great deal on what others tell us to acquire knowledge that may otherwise be difficult to obtain on our own (Harris, 2012). Testimony thus serves as an efficient means for the transmission of knowledge between individuals (e.g., Dawkins, 1993). However, in order to truly serve this purpose, it can be argued that a normative standard for making assertions with epistemic certainty is required (Stanley, 2008). In situations that do not provide an opportunity to assess an informant's process, without such a standard, individuals are prone to trusting misleading or false information.

Technological advancements currently facilitate almost instantaneous global circulation and retrieval of testimony. Children and adults alike are increasingly faced with a task of evaluating empirical claims without an ability to assess the validity of an informant's process. In such cases, individuals may rely on intuitive heuristics based on the identity of the informant. Despite the fact that, in most cases, group membership is irrelevant to the reliability of one's empirical claim, it is often the most immediately available pieces of information upon initial introduction to an informant. Motivations to draw favorable characterizations of those whom we

affiliate (i.e., in-group members; Billing & Tajfel, 1973) may thus guide individuals' epistemic trust in others. Specifically, individuals' ascriptions of trust may be based on biased attributions of informants' standards of empirical practices.

Without practicing skeptical habits of mind in relation to the role social motivations play, we risk choosing faulty sources or unknowingly filtering the information we receive. There is some evidence of this in adult research, as in Metzger, Flanagin, and Medder's (2010) study where adults explain the importance of perceived similarity to a source, in terms of shared values, when evaluating the reliability of online information; the participants highlighted this to be especially true when searching for information about current events (e.g., see also Meirick & Bessarabova, 2016). The investigation at hand sought to explore whether young children use their expectations related to verification behaviors to inform their attributions of verified and unverified claims to in- and out-group members. Participants were asked to make attributions of verified and unverified claims related to an observable reality to minimal group members. A greater inclination to ascribe verified claims to members of one's in-group was theorized to suggest participants' positive characterization of an individual based on their *choice* to verify the claims they make to others. Along the same lines, a greater inclination to ascribe unverified claims to out-group members was theorized to suggest a negative characterization of an individual based on their choice *not* to verify.

We found that children were just as likely to predict that an in-group member made a verified claim as they were an out-group member. Likewise, results show that children were just as likely to predict that an out-group member made an unverified

claim as they were an in-group member. Children's perceived similarity to in-group members was, however, found to relate to their attributions of verified claims to in-group members. Although our predictions were not entirely supported, there are a number of plausible explanations for these outcomes. Below is a review of three issues in relation to the present behavioral attributions task proposed as falling short of addressing the empirical questions at hand.

5.1 The Interpersonal Dimension of Testimony

The items presented in the behavioral attributions task each described a single individual as expressing curiosity about the contents or a particular feature of an encountered object. Regardless of whether or not they proceed to verify this information, each scenario concluded with the individual "saying" a plausible response to their previously expressed curiosity. Critically, as it is only a single individual that is referenced in each scenario, such statements are not in fact testimonial claims. Testimony is defined as an intentional act in which a credible assertion is communicated to another person (Harris & Koenig, 2006). Although individuals were clearly described to have verified or not verified the information they wondered about, it is possible that children did not view either act in a positive or negative light due the fact that someone else was not seemingly intended to be the listener of that information. Surely it is conceivable for an individual to not be expected to verify all that they wonder to themselves about.

A more appropriate method to test our predictions may be presenting participants with scenarios which involve an exchange between two individuals. This

type of scenario would provide more context for participants to evaluate the potential social value of verifying the information that one intends to communicate to others. It would be important, however, to ensure that the listener of this assertion would not be perceived by participants to have witnessed whether or not the individual verified their claim. As previously discussed, prior work has established that by four-years of age, children appropriately attribute relevant episodic knowledge to informants observed to have perceptual access to a relevant information source (e.g., Brosseau-Liard & Birch, 2011; Ganea, Koenig, & Millet, 2011; Nurmsoo & Robinson, 2009; Pillow, 1989; Robinson, Champion, & Mitchell, 1999). If presented with the interpersonal situation that is described above, children would therefore understand that it is only the verifying individual that could *know*, or be epistemically certain, of the information they communicate. What is still unknown, based on the current studies, is whether children would be socially inclined towards those who verify, as well as socially disinclined towards those who fail to verify the claims they make to others.

5.2 Verification (Or Not) As an Intentional Act

A central question of the current investigation is whether children perceive one's *choice* to verify the information they communicate to others as a positive quality of an individual with whom they would like to affiliate. In order to address this empirical question, scenarios must then clearly illustrate that such a conscious decision was made. Another methodological concern of the behavioral attribution task is its ambiguity in demonstrating that individuals made an active-choice in

verifying or failing to verify information. Despite clearly stating whether or not the individual performed the correct evidentiary action (e.g., wondering how many gummy bears there are in a jar and then counting or not counting them), the situations were presented without any indication that an active-choice was made to verify or not. One option to address this point is to add to the current scenarios an explicit reference to the individual's conscious choice. For instance, following the individual stating their curiosity as to what is inside a box, rather than presenting in its current version, "then, they looked [did not look] in the box and said there are crayons in the box!", the following could be used in its place, "they stopped to think and decided that they would [not] look inside the box. Then, they said there are crayons in the box!". This addition to the scenario scripts would leave little room for participants to interpret any other factors other than the individual's conscious choice as the cause for whether or not a verified or unverified claim was made.

5.3 Presentation Modality and Its Effects on Comprehension

Another consideration is the cognitive load imposed by presenting the eight scenarios verbally. Prior research has established that young children demonstrate better story-recall and comprehension when presented in an audiovisual format, compared to only audio (Beagles-Roos & Gat, 1983; Gibbons, Anderson, Smith, Field, & Fischer, 1986). Therefore, although the additions to the current scenarios described above may better address our central question, a certain level of the young participants' listening comprehension is required. The advantages of utilizing an audiovisual format for presenting the behavioral attributions items would go beyond

optimizing young children's comprehension of the situations in which verifiable claims are made. For instance, instead of explicitly stating that the individual made the "decision" to verify or not to verify the information wondered about, audio-visually presented scenarios would allow for the individual's choice to be inferred. The participants would have an opportunity to deduce from individuals' particular behaviors that they were aware of *how* to verify the information wondered about and that they *chose* to follow through or not to follow through on obtaining evidence prior to making a claim.

This point seems especially important in two respects. First, young children are shown to be more forgiving of testimonial errors if an informant does not have appropriate access to an information source (e.g., Nurmsoo & Robinson, 2009). Second, and in extension, if children do hold a normative expectation that one ought to make claims with epistemic certainty, then it is likely prescribed in a particular context. That is, children may expect adherence to such a norm with the stipulation that the individual is perceived both to have access to the relevant epistemic source and to understand the particular process that is required to obtain evidence in support of their claim. Thus, in possible future work, it is crucial for participants to recognize that the individual exercises agency when deciding whether or not to verify the information they plan to communicate to others is in fact accurate.

In order to meet the goals outlined above, I discuss how one of the present task items-- describing an individual who wonders whether a red or yellow ball rolls faster down a ramp-- could be adapted. In a video of such a scenario, following the individual's expressed curiosity in both the verified and unverified conditions, they

could proceed to put both balls on the ramp so as to demonstrate their understanding of how to verify the information they seek. In the verified condition, to illustrate the individual's active-choice to verify, they could be shown as pausing to think while looking at both balls they just placed at the top of the ramp. They could then nod their head and continue to drop both balls down the ramp before claiming that the yellow ball rolls faster than the red one. Whereas in the unverified condition, in order to depict the individual's active-choice *not* to verify, following their pause to think, they could proceed to take both balls off the ramp and place them on the ground before also making the assertion that the yellow ball is the faster of the two.

The discussion thus far has focused on three issues related the behavioral attributions task in providing an adequate empirical test of these studies' central questions. In brief review, the scenarios presented to participants failed to depict interpersonal contexts in which individuals made an active-choice to verify or not to verify the claim they make to others. Further, the modality by which the scenarios were presented to participants potentially hindered comprehension of the situations for which their attributions were based. Taken together, participants may not have had a clear understanding of both the intended contexts, and even those that were in fact presented, when asked to make attributions of verified and unverified statements to minimal in- and out-group members.

In subsequent discussion, children's general tendency to trust claims that are consistent with existing intuitions is also considered. I explain how this tendency could indicate that the plausible statements made by individuals in the behavioral attributions task were perceived as likely accurate representations of reality thus not

necessarily required to be verified. I then turn to a discussion of the second posed consideration, raising questions about young children's perception of a relationship between evidentiary behaviors and an informant's honesty.

5.4 Plausible Versus Verified Claims

Some have argued that young children and adults alike demonstrate a general tendency to trust testimony (Gilbert, 1991; Jaswal, Croft, Setia, & Cole, 2010; Sperber, 2001). Prior work indeed suggests that if there is no clear reason to doubt an encountered claim, both children and adults default to a trust in its accuracy. In various domains, it is reasonable to do so, as there are myriad cases where it can be difficult or impossible for one to gather direct perceptual evidence for verifying what they have been told (Harris, 2012).

Young children's bias to trust new information seems to hold true even when it contradicts their intuitive conceptions of the world--such as when learning about scientific concepts like the existence of invisible germs and the spherical shape of the earth as well as religious concepts such as Heaven and God as an all-knowing and all-powerful being ((Braswell, Rosengren, & Berenbaum, 2012; Guerroro, Enesco, & Harris, 2010; Lane & Harris, 2015). In contrast to these cases, there are some instances where children can easily test an informant's claim. For example, if presented with a group of objects and told that when dropped from a certain height some will bounce, and some will break, children could easily test this claim and learn through experimentation that varying material properties cause different reactions

upon collision. Prior research suggests a developmental pattern in children's tendency to seek evidence for verifying a presented claim.

For example, in Ronfard, Chen, and Harris's (2018) study, participants were presented with two forms of testimony (i.e. intuitive and counterintuitive) and provided an opportunity to verify their accuracy. Their findings reveal that four and seven-year-old children were not compelled to verify an experimenter's claim when it was consistent with their existing intuitions (i.e. intuitive testimony; "the largest within a group of dolls is the heaviest"). It was only when presented with a counterintuitive claim (e.g., the smallest within a group of dolls is the heaviest) that the seven-year-old participants, but not the four-year-old participants, seized the opportunity to gather empirical evidence for confirmation (Ronfard et al., 2018).

In the current investigation's behavioral attribution task, regardless of whether the individual chose to verify, each statement made corresponding to their previously expressed curiosity was reflective of a plausible reality. For instance, one item describes an individual who walks by a classroom and wondered what the class was doing. After looking or not looking inside the classroom, this individual "said" that the class was reading. Because such a statement is likely consistent with children's existing intuitions, it is possible that children perceived whether or not the individual verified that the class was in fact reading as inconsequential to whether or not it was an accurate piece of information. That is, despite being unverified, for instance, children could perceive a statement regarding students that are reading inside a classroom as likely a true representation of reality. As Ronfard et al.'s (2018) findings show, even when personally provided with an opportunity to check the validity of a

given claim, children tend to accept intuitive assertions at face-value. In turn, children may not have perceived individuals' unverified claims in the presented behavioral attribution scenarios as disconcerting based on the intuitive nature of their content.

If scenarios were to describe individuals making claims that are surprising or inconsistent with previous experiences, it is possible that participants may have been more inclined to view the individual's choice to verify or not to verify in a positive or negative light. However, such scenarios would test whether children ascribe social value to one's choice to verify a claim based on the intuitiveness of its content; this would not address the central questions of this investigation. The current studies' main focus was to explore whether young children perceive some extent of social value in individuals' *choice* to verify the claims they make to others. Children's attributions must therefore be solely based on the individual's choice of whether or not they gather evidence to justify their assertion, irrespective of the nature of its content.

Further, one of the theoretical perspectives guiding this investigation was the potential normative dimension of children's reasoning about the reliability of empirical claims. That is, perhaps children hold an expectation of an informant's epistemic certainty when making an assertion. The current studies failed to provide more insight in respect to this possibility as individuals described in the behavioral attribution task scenarios never made clear assertions. Nevertheless, if children expect an informant's adherence to such a norm, then it is not likely selectively prescribed to contexts in which counterintuitive claims are made. If this were in fact the case, then an expectation of epistemic certainty would not in fact be characterized as a social

norm for making assertions, as this would encompass all forms of empirical claims, whether they are intuitive or not.

5.5 The Choice to Verify as Dispositional

An individual's choice to verify the claims they make to others can be interpreted as their self-designated responsibility to provide accurate information and to serve as a reliable epistemic source to others. In line with this view, one could characterize a verified claim as an *honest* one. In Li et al.'s (2014) study, children ages three to five were presented with two informants, each introduced using a trait-label (i.e., honest or dishonest). Participants were also presented with a behavioral example that illustrated each trait-label. Li et al.'s (2014) findings show that only the oldest participants at five years of age, demonstrate a systematic trust in those who were honest.

The current studies did not aim to determine whether young children infer one's choice to verify the information they share with others as an honest act. However, it is possible that children may be inclined to believe so under specific circumstances—such as interpersonal situations in which an informant's active choice to verify or not to verify their assertion is clearly illustrated. Although young children may understand honesty as an informative trait-label in determining whom to trust (e.g., Li, Heyman, & Xu, 2014), it is not clear if they are likely to perceive one's choice to verify information as indicative of their honesty. In the current studies, it would require several steps in children's cognitive process for attributions of verified and unverified claims to serve as proxies for their ascriptions of honest and dishonest

behaviors to group members. Children would have to independently infer honesty or deception based on the individual's evidentiary practices. This seems unlikely as young children have more difficulty with making such inferences in deciding whom to trust (e.g., Vanderbilt, Heyman, & Lieu, 2014), an arguably simpler task than making behavioral attributions.

Conclusion

The fact that there are myriad potential cases in which it is difficult or impossible for an individual to directly assess the accuracy of an empirical claim does not suggest that we should succumb to generally accepting all claims that we ourselves cannot directly verify, nor does it mean that we should regard them as unreliable. Not only would individuals' cognitive development be limited but, at a much broader level, scientific progress would stagnate if either of these approaches were to be culturally adopted. Instead, children and adults alike must develop and appropriately apply strategies for distinguishing between reliable and unreliable sources.

In promoting the development of scientific thinking, we must further emphasize critically thinking about the role social motivations play in selecting information sources. Individuals need to select their sources based on assumptions of whom they should trust in providing accurate and reliable information. It is essential that we therefore gain a deeper understanding of the potential influence social-biases have on individuals' ability to effectively apply skeptical habits of mind when evaluating the truth-value of encountered claims.

Potential avenues for future work in developing a more appropriate empirical test to answer the current investigation's central questions have been outlined. We have yet to fully address at what point in development, if at all, children perceive some extent of social value in individuals' *choice* to verify the information they plan to communicate to others. When we don't have an opportunity to evaluate the source or process by which a claim is founded upon, it is that much more important that we practice introspection, so as to not to justify our trust in a source based on an assumed standard of empirical practice.

Appendix A

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INSTITUTIONAL REVIEW BOARD

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DATE:	November 6, 2017
TO:	Lucas Butler, PhD
FROM:	University of Maryland College Park (UMCP) IRB
PROJECT TITLE:	[1144955-1] Interactions Between Children's Epistemic and Social Reasoning
SUBMISSION TYPE:	New Project
ACTION:	APPROVED
APPROVAL DATE:	November 6, 2017
EXPIRATION DATE:	November 5, 2018
REVIEW TYPE:	Expedited Review
REVIEW CATEGORY:	Expedited review category #7; 45CFR46.404

Thank you for your submission of New Project materials for this project. The University of Maryland College Park (UMCP) IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

Prior to submission to the IRB Office, this project received scientific review from the departmental IRB Liaison.

This submission has received Expedited Review based on the applicable federal regulations.

This project has been determined to be a Minimal Risk project. Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of November 5, 2018.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Unless a consent waiver or alteration has been approved, Federal regulations require that each participant receives a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this committee prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others (UPIRSOs) and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office. Please use the appropriate reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

Please note that all research records must be retained for a minimum of seven years after the completion of the project.

If you have any questions, please contact the IRB Office at 301-405-4212 or irb@umd.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Maryland College Park (UMCP) IRB's records.

Appendix B

UNIVERSITY OF MARYLAND

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DATE:	July 9, 2018
TO:	Lucas Butler, PhD
FROM:	University of Maryland College Park (UMCP) IRB
PROJECT TITLE:	[1144955-2] Interactions Between Children's Epistemic and Social Reasoning
REFERENCE #:	
SUBMISSION TYPE:	Amendment/Modification
ACTION:	APPROVED
APPROVAL DATE:	July 9, 2018
EXPIRATION DATE:	November 5, 2018
REVIEW TYPE:	Expedited Review
REVIEW CATEGORY:	Expedited review category # 7

Thank you for your submission of Amendment/Modification materials for this project. The University of Maryland College Park (UMCP) IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

Prior to submission to the IRB Office, this project received scientific review from the departmental IRB Liaison.

This submission has received Expedited Review based on the applicable federal regulations.

This project has been determined to be a Minimal Risk project. Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of November 5, 2018.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Unless a consent waiver or alteration has been approved, Federal regulations require that each participant receives a copy of the consent document.

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All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

Please note that all research records must be retained for a minimum of seven years after the completion of the project.

If you have any questions, please contact the IRB Office at 301-405-4212 or irb@umd.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Maryland College Park (UMCP) IRB's records.

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